

College Overview 2001-2002

The University of Texas at El Paso

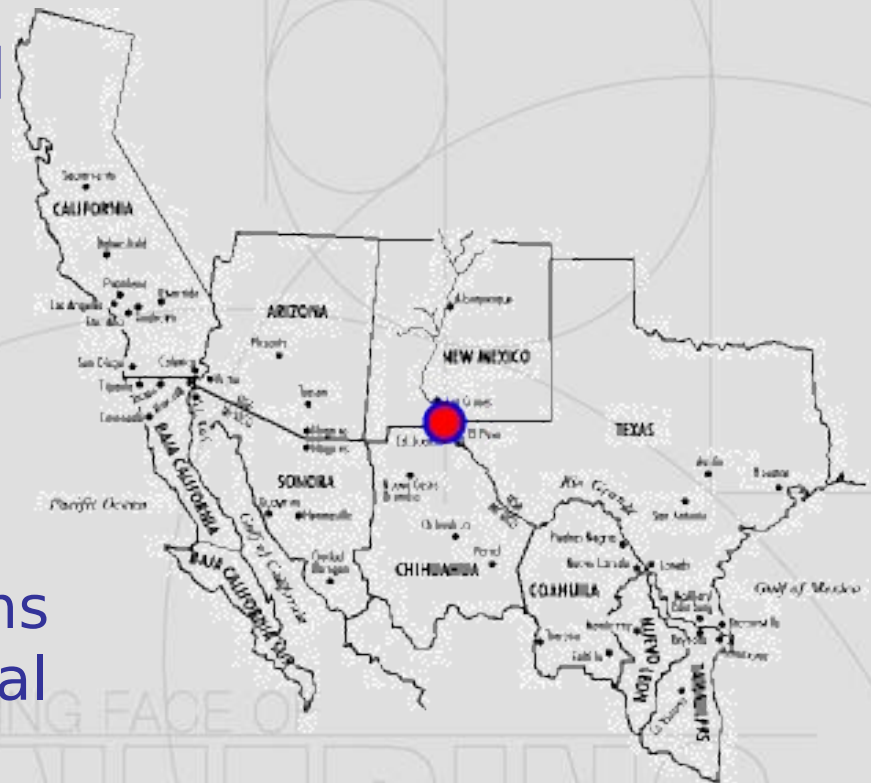


Minority College Relations Workshop
U.S. Department of The Army and
Operations Support Command
Rock Island, Illinois
29 July - 2 August 2002



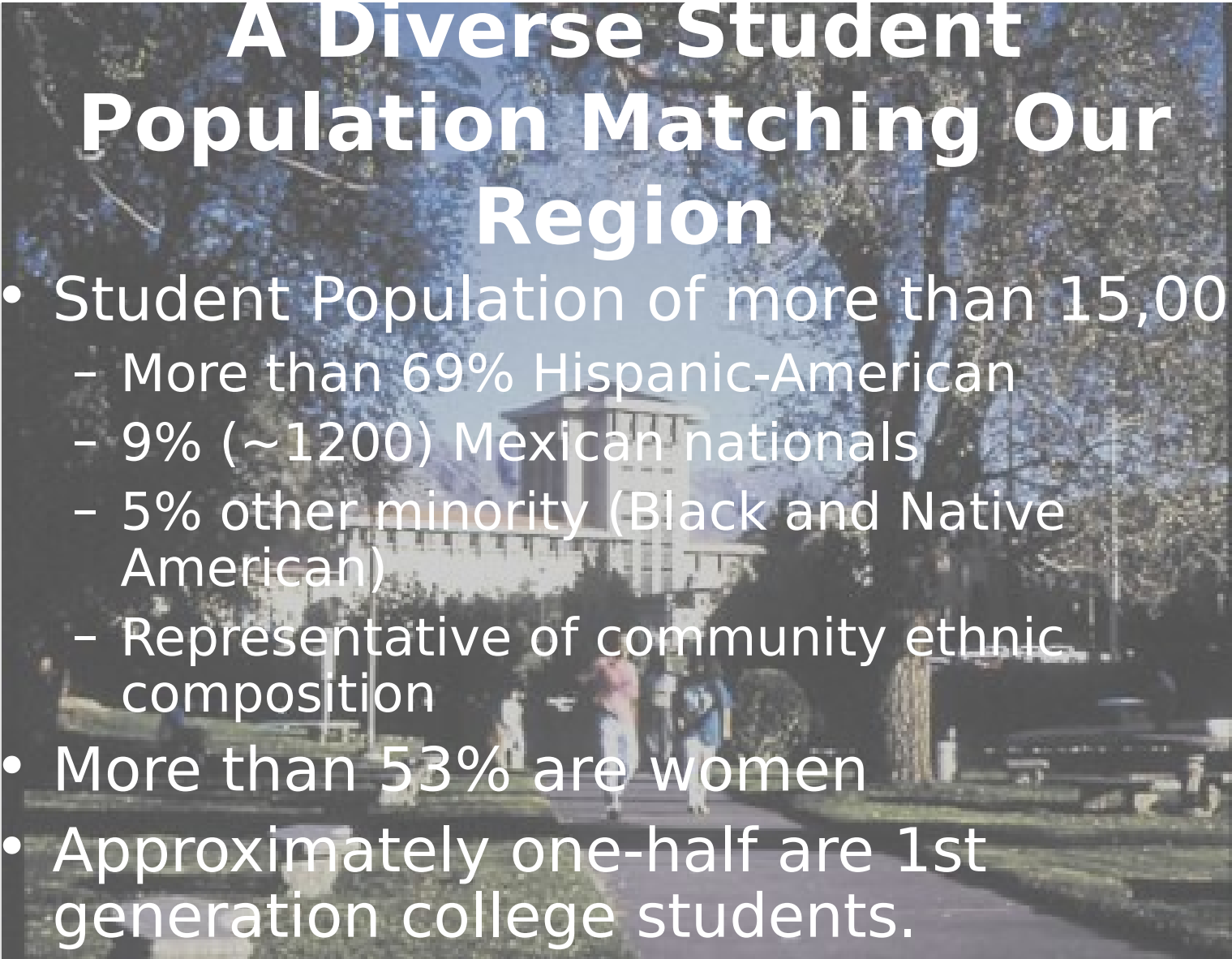
A Profile of UTEP

- The largest institution of higher education located on U.S.-Mexican border.
 - Founded in 1914, six colleges offer--
 - 64 baccalaureate degrees
 - 57 master's degrees
 - 9 doctoral degree programs
- Carnegie Research/Doctoral Intensive Institution





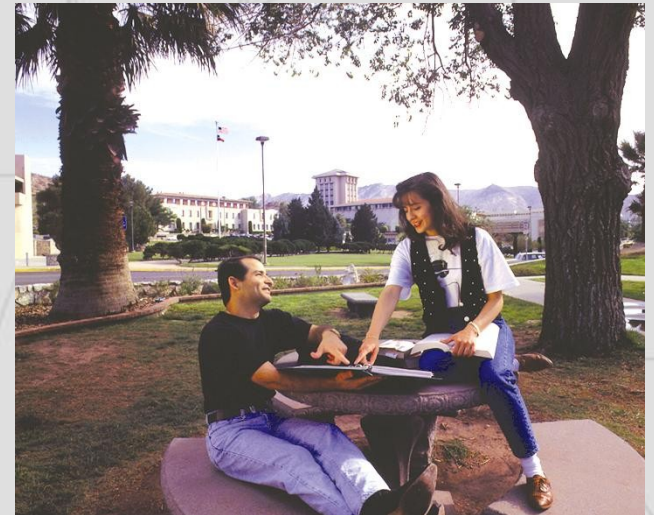
A Diverse Student Population Matching Our Region

- Student Population of more than 15,000
 - More than 69% Hispanic-American
 - 9% (~1200) Mexican nationals
 - 5% other minority (Black and Native American)
 - Representative of community ethnic composition
 - More than 53% are women
 - Approximately one-half are 1st generation college students.
- 



Recognized for Excellence in Minority Advanced Education

- UTEP Named Model Institution for Excellence by NSF in 1995 (second 5 year award renewed in 2000).
- Received NSF's Institutional Achievement Award in 1993 for efforts to increase underrepresented minority participation in math, science and engineering.





National Leader in Hispanic Education

- Based on DoEd figures, UTEP ranked 2nd Nationally in bachelor degrees awarded to Hispanics; 11th in Masters.
- In number of degrees awarded to Hispanics in selected academic disciplines, UTEP ranks:
 - 1st in Engineering.
 - 1st in Health Sciences.
 - 2nd in Physical Sciences and Science Technologies.
 - 2nd in Business Management and Administration.
- First in number of Hispanic graduates going on to obtain PhD's.

THE CHANGING FACE OF
ENGINEERING



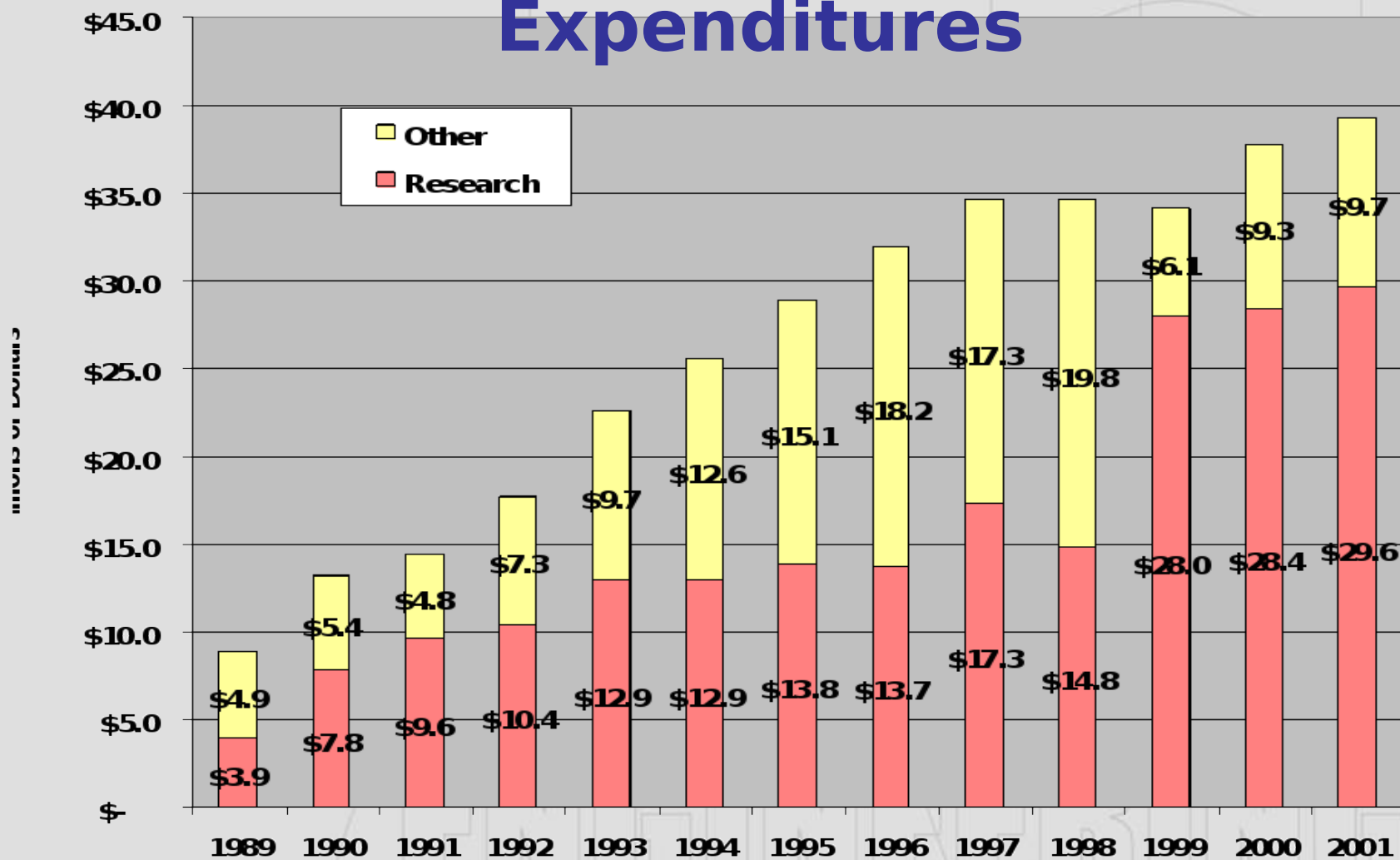


Overview of Research and Sponsored Projects

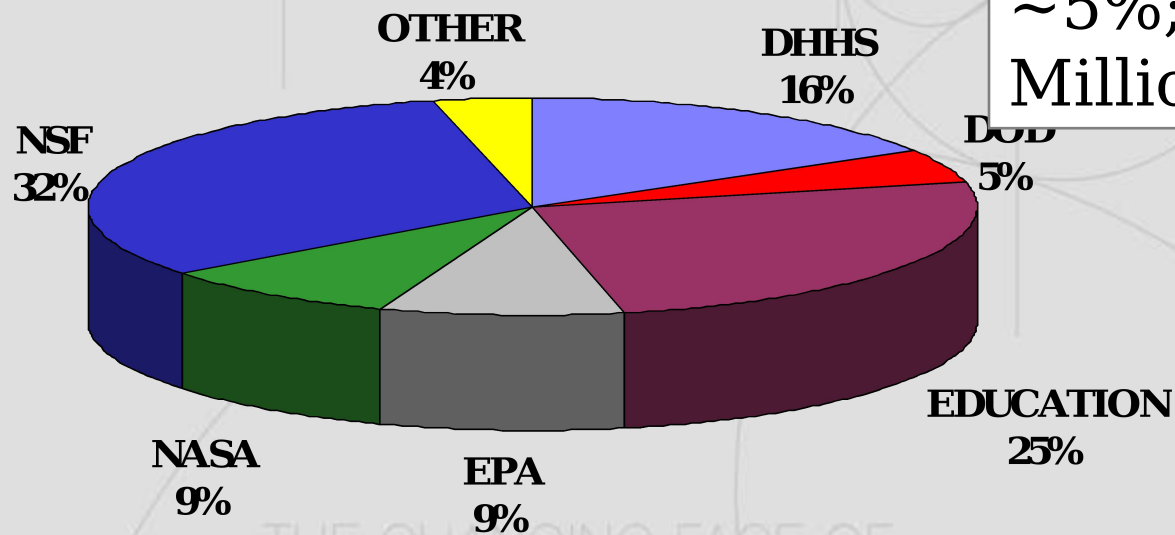
- Total Active Awards (6/02):
 - All Sources: \$120 Million
 - Federal: ~88% (NSF, DOEd, EPA, NASA, DOC, DOE, etc)



History of Research Expenditures



ACTIVE AWARDS BY FEDERAL AGENCY



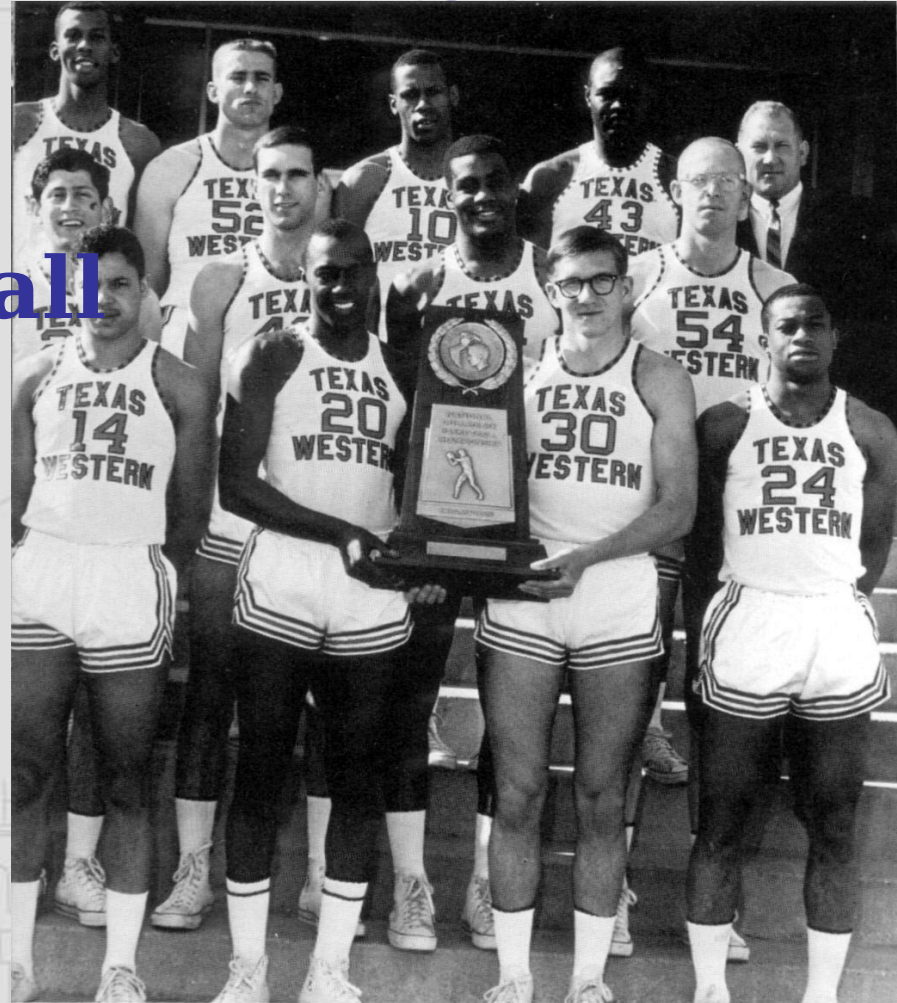
Total
Active:
~\$105.6
Million

DHHS DOD EDUCATION EPA NASA NSF OTHER



Texas Western College (UTEP)

NCAA Basketball Champs 1966



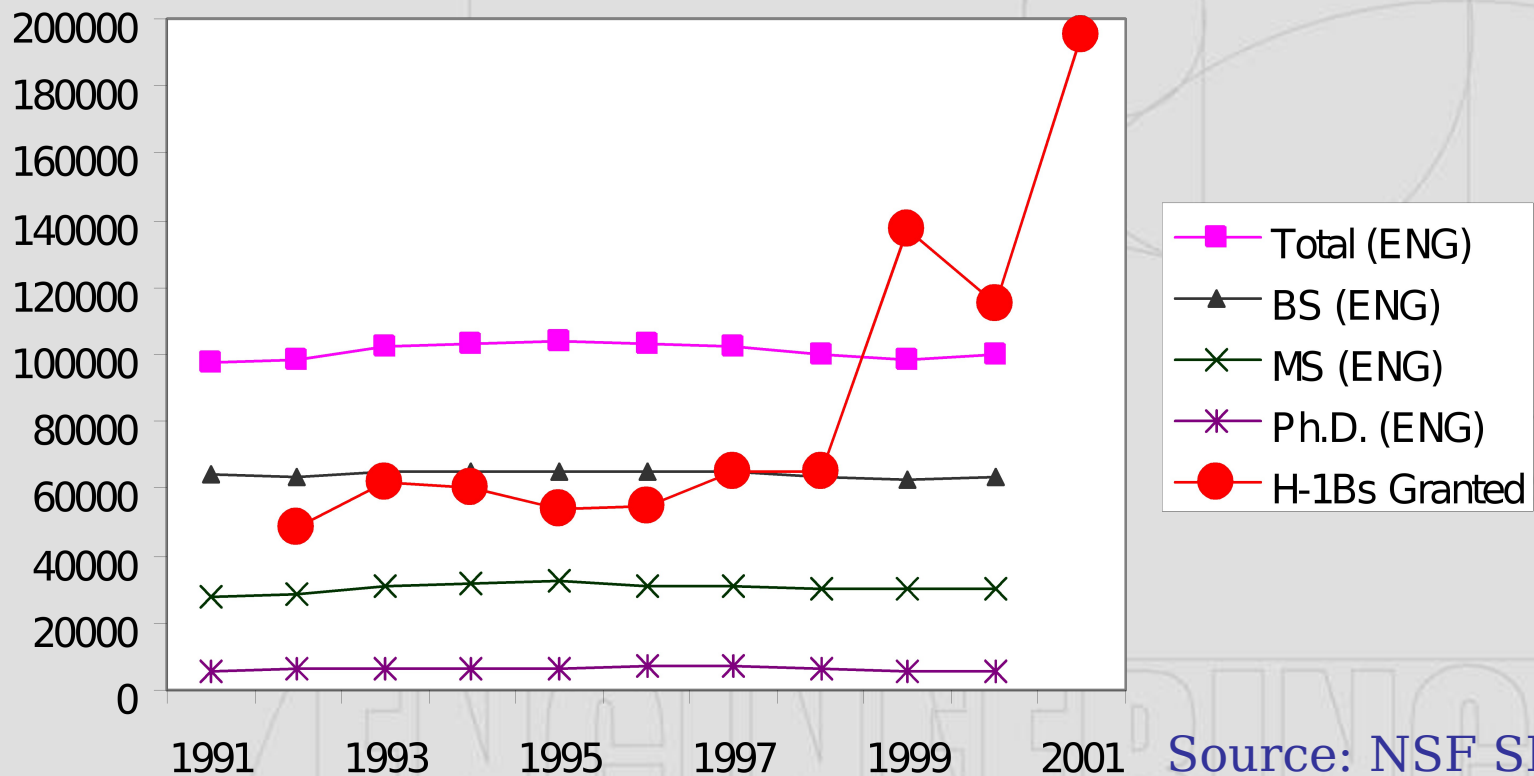
College of Engineering Profile



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ENGINEERING



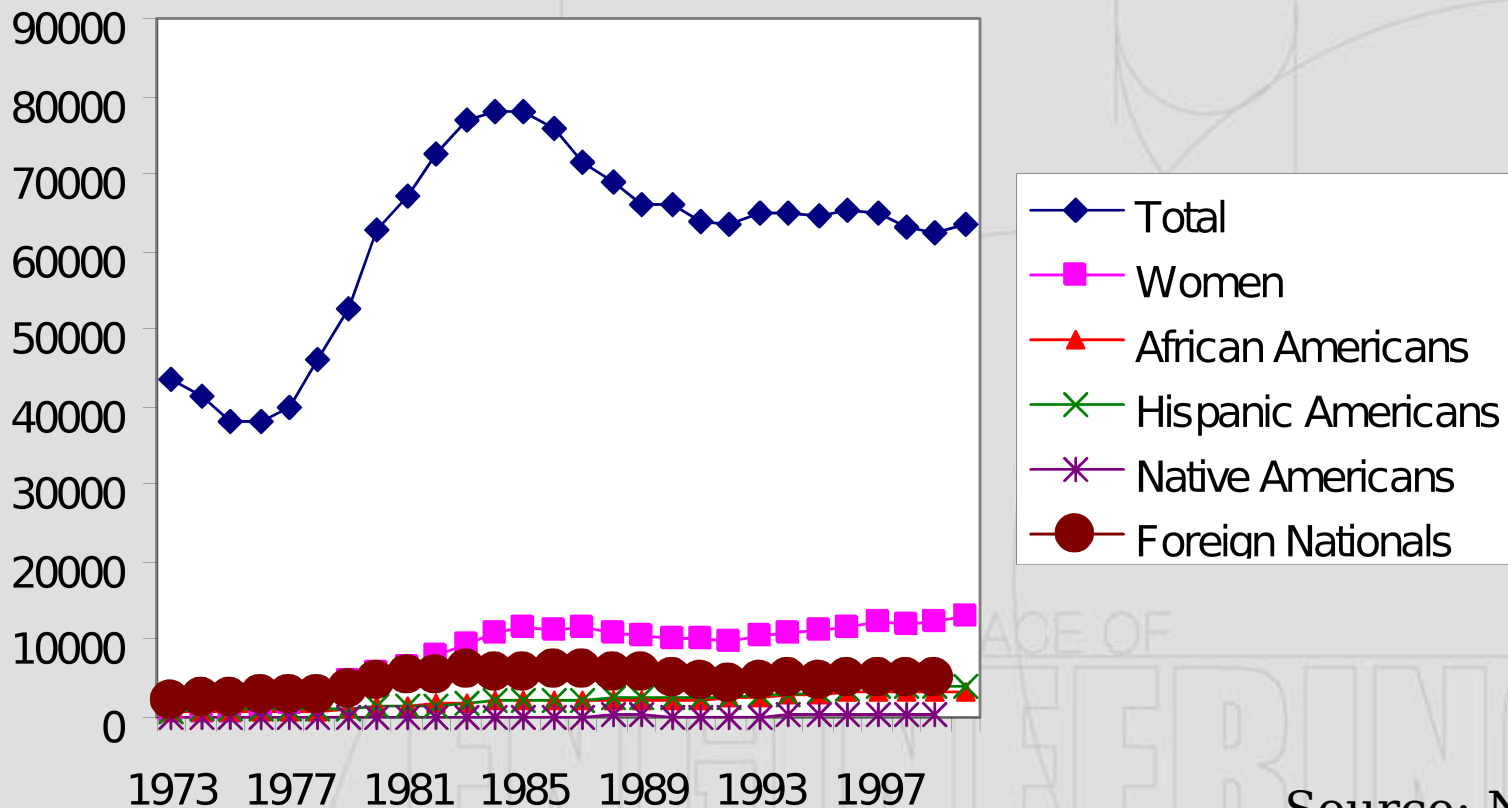
U.S. Engineering Degrees Engineering 1991 - 2000



Source: NSF SRS



Engineering Bachelors Degrees 1973 - 2000



Source: NSF SRS





TOP PRODUCING STATES

Minority Engineering Baccalaureates, 2001

- California [CSU, Long Beach]
- Texas [UTEP, Prairie View, Texas A&M University]
- Florida
- New York [Clarkson, Manhattan, Polytechnic, RPI, RIT]
- Michigan [Michigan State]
- North Carolina [NC State, NC A&T]
- Maryland
- Massachusetts

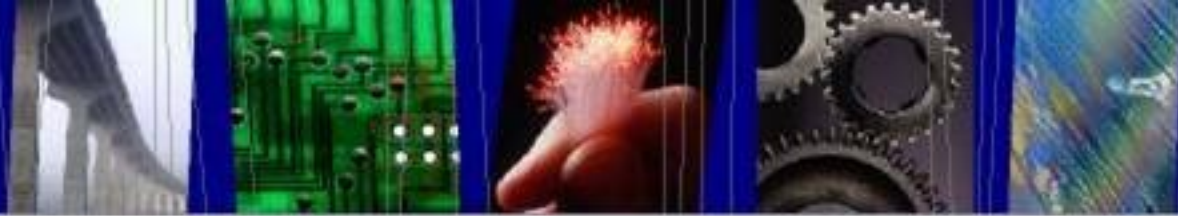


TOP TEN PRODUCERS

Minority Engineering Baccalaureates, 2001

• North Carolina A&T	166
• UTEP	157
• Georgia Tech	153
• Florida International	150
• Texas A&M University	121
• MIT	118
• Michigan	117
• New Jersey IT	116
• Florida	115
• UT, Austin	113





TOP TEN FIRST-YEAR ENROLLMENTS

Minority Engineering Undergraduates, 2000

- UTEP 467
- North Carolina A&T 344
- Texas A&M University 305
- Florida A&M University 298
- Prairie View 285
- Southern 271
- Michigan State 263
- UT Austin 262

Source: NACME, 2002





DEGREE PROGRAMS OFFERED

BACHELORS OF SCIENCE IN ENGINEERING/ALL ABET- ACCREDITED

CIVIL
COMPUTER SCIENCE
ELECTRICAL
INDUSTRIAL
MECHANICAL
METALLURGICAL

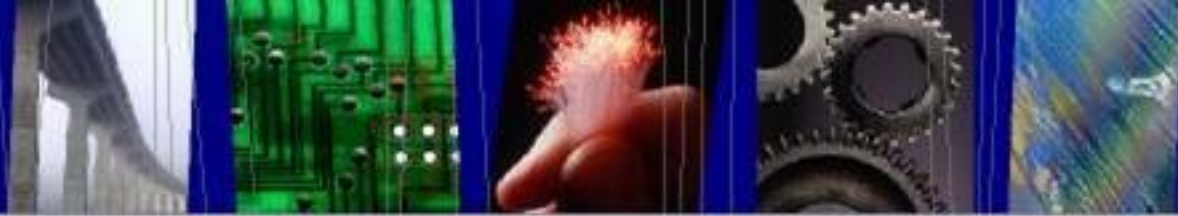
MASTERS OF SCIENCE IN ENGINEERING

CIVIL
COMPUTER ENGINEERING
COMPUTER SCIENCE
ELECTRICAL
INDUSTRIAL
MANUFACTURING
MECHANICAL
METALLURGICAL & MATERIALS

DOCTORATE IN ENGINEERING

COMPUTER ENGINEERING
ENVIRONMENTAL SCIENCES IN ENGINEERING
MATERIAL SCIENCE & ENGINEERING
CIVIL ENGINEERING
MANUFACTURING ENGINEERING





College Highlights ¹

The 2001 National Engineering Workforce Commission Report ranks UTEP the fifth (5th) largest engineering school in Texas.

The College of Engineering is ranked the #1 school in the continental United States in the production of Hispanics receiving BS degrees in engineering.

UTEP was ranked the top U.S. per capita baccalaureate producer for Hispanic engineering and science Ph.D.'s from 1993 to 1997, based on a recent study from American University.

A new 25,000 square foot Engineering Annex building has been approved for construction. Completion is expected by fall 2004.

A Corporate Capital Campaign has been approved and is underway to secure funds for renovating classroom and laboratory space in the existing Engineering building.





College Highlights ²

A campaign lead gift of \$1 million to upgrade laboratory facilities and support research in Bio-Engineering has been given by the Keck Foundation.

Over 300 companies annually recruit UTEP engineering graduates.

The majority of employers surveyed in 2001 have an established record of recruiting and hiring UTEP engineering graduates - with 73% recruiting for over 5 years.

Over 95% of the students and alumni surveyed in 2001 rate the quality of the programs in the College of Engineering as “Good or Excellent.”

Six UTEP alumni were national Hispanic Engineer National Achievement Awards Conference (HENAAC) winners in 1999. The College of Engineering was the academic host for this prestigious national conference between 1999 - 2001.

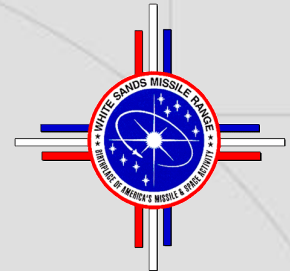


Industrial Affiliates Group Members/Key Employers



Raytheon

DELPHI
Automotive Systems
Driving Tomorrow's Technology



CH2MHILL





Vision Statement

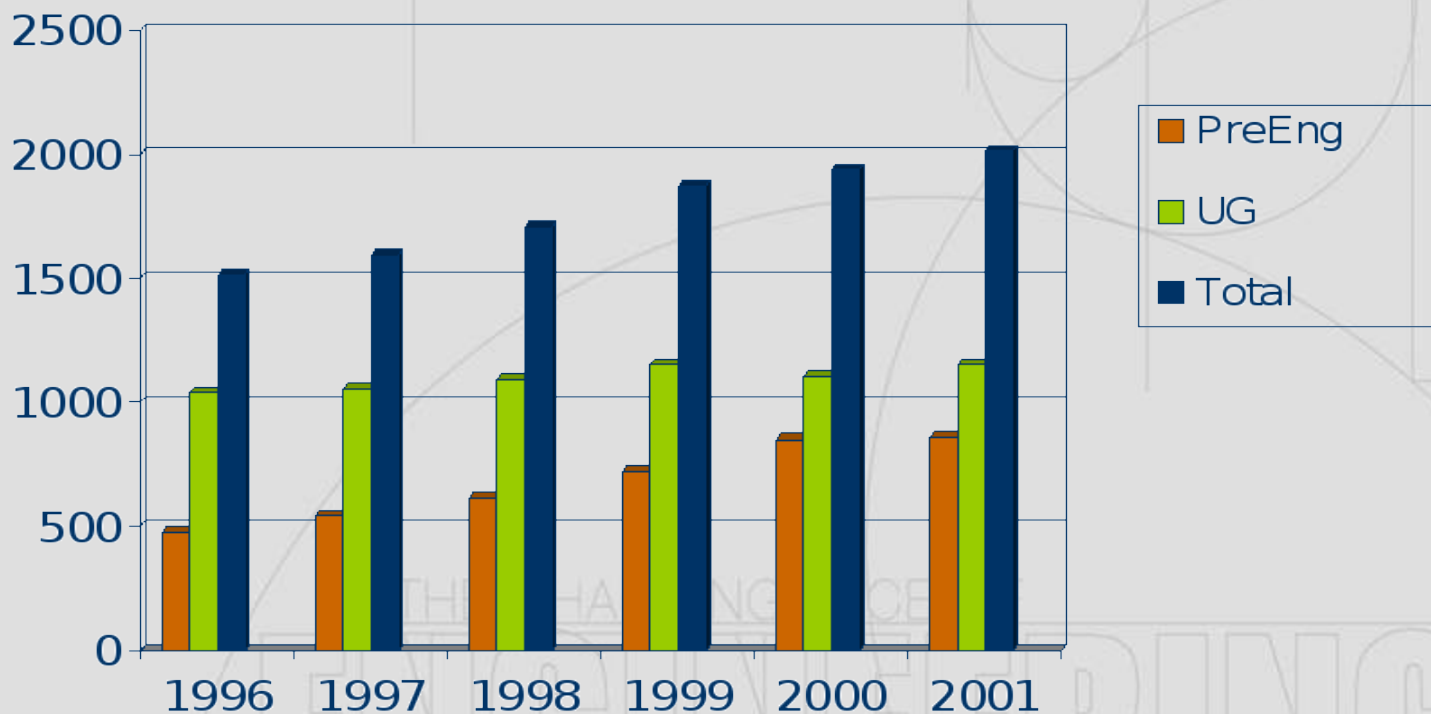
The University of Texas at El Paso, College of Engineering will provide Engineering and Computer Science programs of the highest quality.

THE CHANGING FACE OF
ENGINEERING



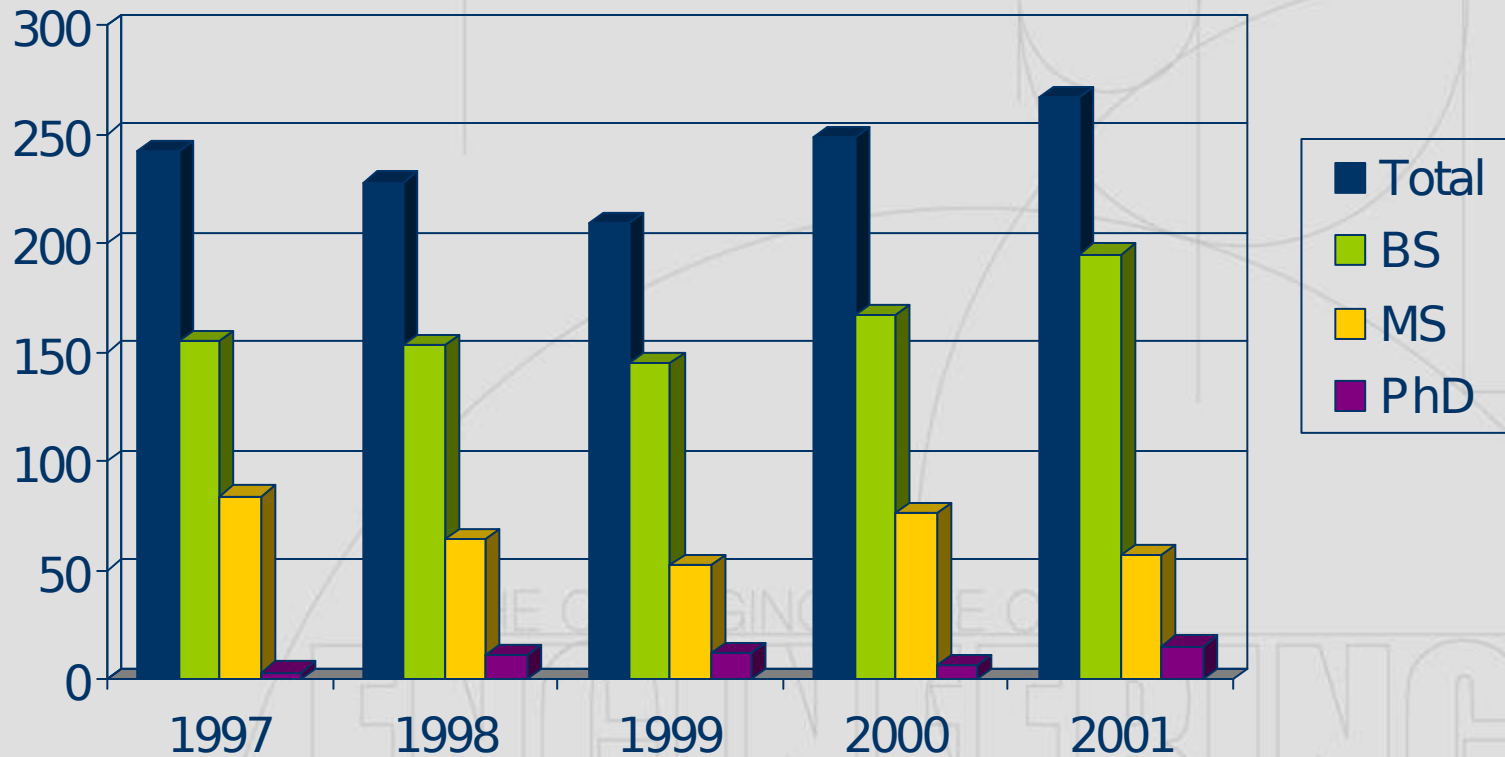
Objective 1 – Increase the number of highly qualified graduates.

Undergraduate Enrollments 1996-2001



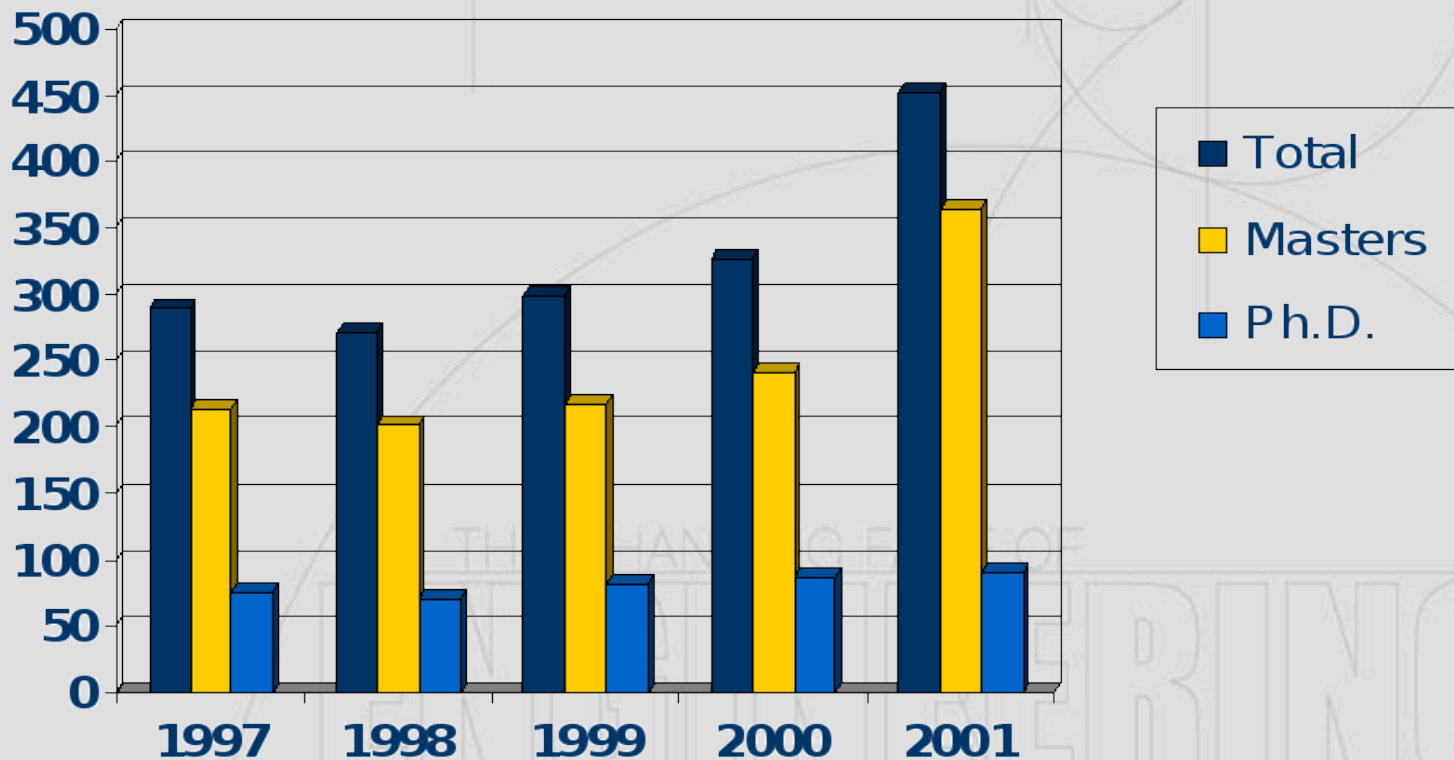
Objective 1 – Increase the number of highly qualified graduates.


Degrees Awarded 1997 - 2001



Objective 2 - Increase graduate educational opportunities, enrollment, and degree production, to include increasing the number of undergraduates who pursue graduate degrees.

Graduate Enrollments 1997-2001






Objective 1 – Increase the number of highly qualified graduates.

Undergraduate Student Profile

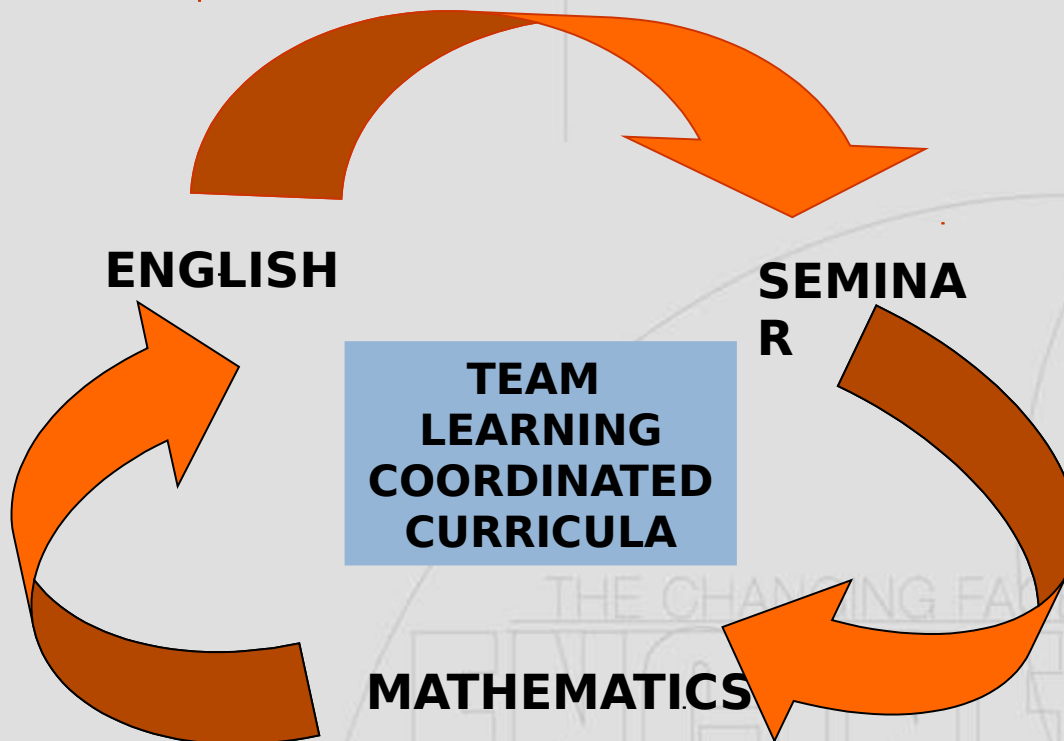
<i>Gender:</i>	Female	22%
<i>Ethnicity:</i>	Hispanic	67%
<i>Parents' Education:</i> 60%	No college	
<i>Student Employment:</i>	Working	75%
<i>Living Arrangements:</i> 90%	Live at home	
<i>Region:</i>	El Paso, Texas	83%





Objective 1 – Increase the number of highly qualified graduates.

MIE Learning Communities



- Cooperative Learning
- Survival Skills
- Learning Skills & Assessment



Objective 1 – Increase the number of highly qualified graduates.

Teaming & Cooperative Learning: Key Elements

- Positive Interdependence
- Individual Accountability
- Group Processing
- Social Skills
- Face to Face Interaction



Objective 1 – Increase the number of highly qualified graduates.

MIE Entering Students Program: CircLES

	GPA Retention	
1997 [Baseline]	2.18	68%
1998 [CircLES]	2.54	80%
1999 [CircLES]	2.74	81%
2000 [CircLES]	2.80	78%

- Summer Orientation
- Cluster Courses
- Cooperative Learning
- Integrated Curriculum
- Engineering Design



Objective 1 – Increase the number of highly qualified graduates.

Model Institutions of Excellence [NSF-MIE]

- Entering Students Program [ESP/CircLES]
- Academic Center for Engineers and Scientists [ACES]
- Research Experiences for Undergraduates [REU]
- Center for Effective Teaching and Learning [CETaL]
- Continuous Quality Improvement [FEAT]




Objective 1 – Increase the number of highly qualified graduates.

Curricular/Programmatic Innovations

- Reverse Engineering
- Basic Engineering Curriculum
- LD & FE Exam Requirements
- Manufacturing Options & Certificate Program
- Sustainable Engineering Program





Objective 4 – Strive to continue and expand partnerships with external constituents.

Engineering Programs Office

“Developing Innovations in Engineering Education”

- Broadly supports College recruitment and retention efforts through a range of co-curricular activities.
- Piloted key elements of The Entering Students Program – now offered to all UTEP first year students within the newly established University College.
- Current Initiatives:
 - K-12 Partnerships
 - Undergraduate Professional Development
 - Faculty Collaborations / “Gatekeeper” Course Redesign





Research Overview



THE CHANGING FACE OF
ENGINEERING





Research Purpose

Provides graduate opportunities for our students to reach their full educational potential.

Provides leading edge technical expertise.

Drives regional economic development.

Fosters new initiatives in the college.

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ENGINEERING





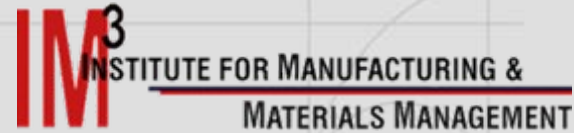
Engineering Research & External Funding

- 65 % of Engineering faculty were engaged in externally funded research in 2001
- Research obligations of the College have averaged \$30M over the last five years
- 136 active research contracts in 2001
- 53 new contracts awarded in 2001
- 134 proposals written in 2001
- Yearly average expenditures have been \$7 M over the last 5 years

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ENGINEERING



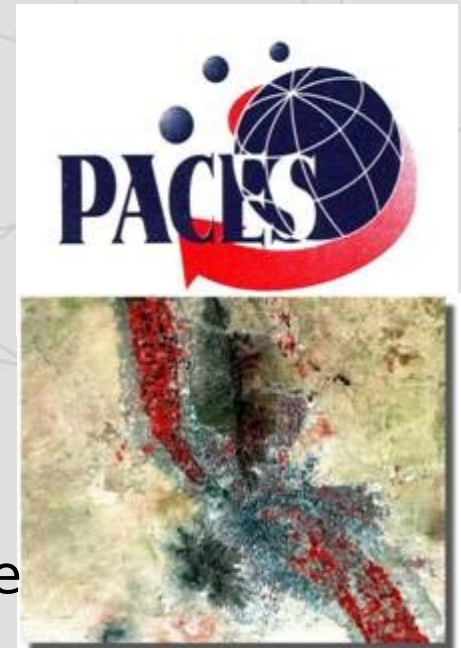
Research Centers



Interdisciplinary Research Centers



Pan-American
Center
for Earth and
Environmental
Studies



Materials Research
& Technology Institute



MRTI



Computer Science Laboratories

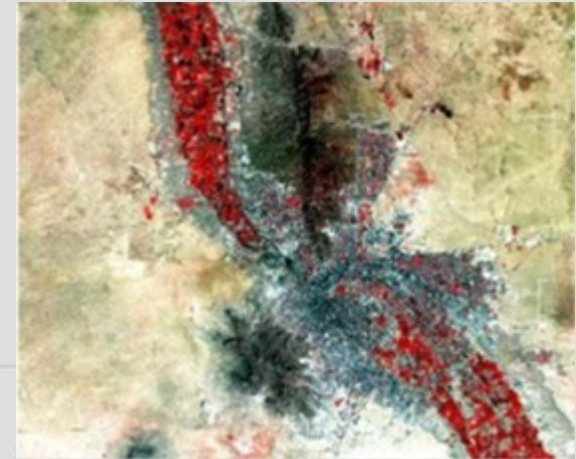
- Systems and Software Engineering Affinity Laboratory
- Theoretical Research and Applications in Computer Science
- Interactive Systems Laboratory
- Computation Communication Integration Laboratory
- Robotics Laboratory
- Academic Center for Engineers and Scientists (ACES) Satellite Laboratory



UTEP Computer Science Research

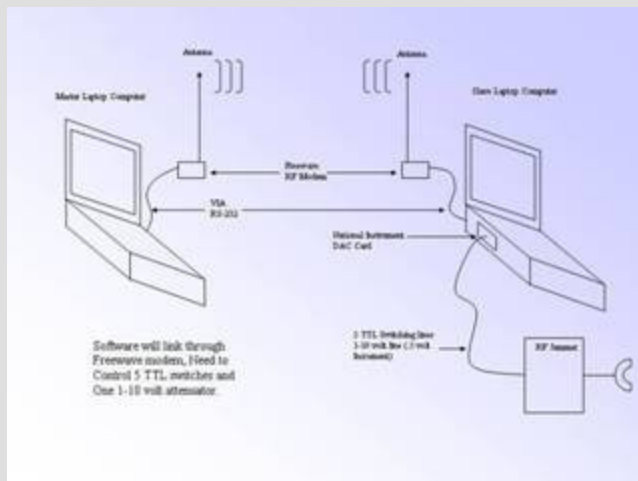
- Theory of computation

- Theme: Theory motivated by applications
- Faculty: Vladik Kreinovich, Luc Longpré, Leon Reznik, François Modave
- Example: Detecting and marking outliers in noisy satellite images, using interval-computation algorithms



- Software engineering

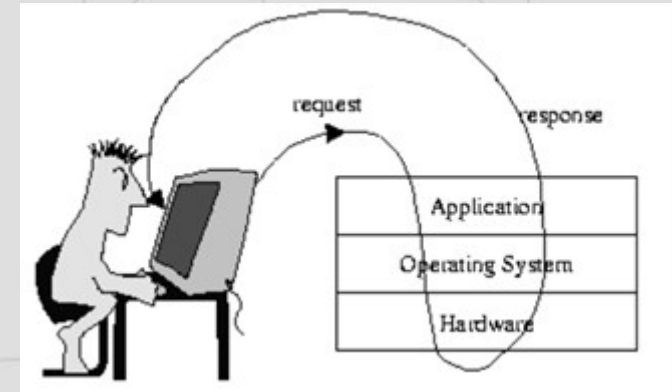
- Theme: High-assurance systems
- Faculty: Ann Q. Gates, Steve Roach
- Example: Remote operation of radio frequency jamming



UTEP Computer Science Research

- High-Performance Computing

- Theme: Performance evaluation
- Faculty: Patricia Teller, Brian d'Auriol
- Example: Predicting end-to-end performance of parallel/distributed implementations of large scale adaptive applications



Can traditional GUI interfaces can be extended to include some of the more dynamic functions associated with spoken conversation? This paper suggests that direct-manipulation (DM) interfaces can be extended by incorporating, via the DM modality itself, interaction techniques that add certain language features associated with spoken conversation.

Clark and his colleagues [Clark and Marshall, 1981; Clark and Wilkes-Gibbs, 1986] reported that, in human-human conversations, the conversants formed mutual beliefs about referents, and that this mutuality extended to the way in which expressions about these referents were generated and understood. Other work [e.g., Lambert and Carberry, 1992] had explored negotiation subdialogues about domain tasks.

Relation: First Sentence

P Can traditional GUI interfaces be ...

S Can traditional GUI interfaces be ...

Interactive Systems

- Theme: Human-Computer Dialogue
- Faculty: David Novick, Nigel Ward, Karen Ward
- Example: Implementing "Conversational" functions in direct-manipulation interfaces





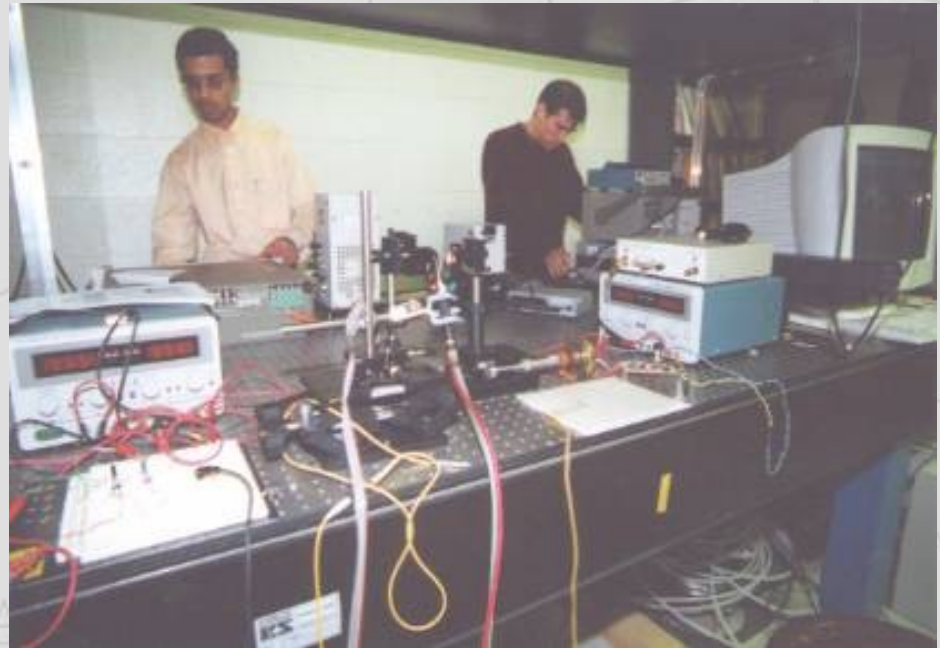
Electrical and Computer Engineering Research Laboratories

- Electronic Devices
- Fiber Optic Research
- Dynamic Systems and Controls
- Signal Processing and Communications
- Dynamic Systems and Controls
- Imaging Science
- Neuro Fuzzy Systems
- VLSI and Embedded Systems
- Biomedical Engineering



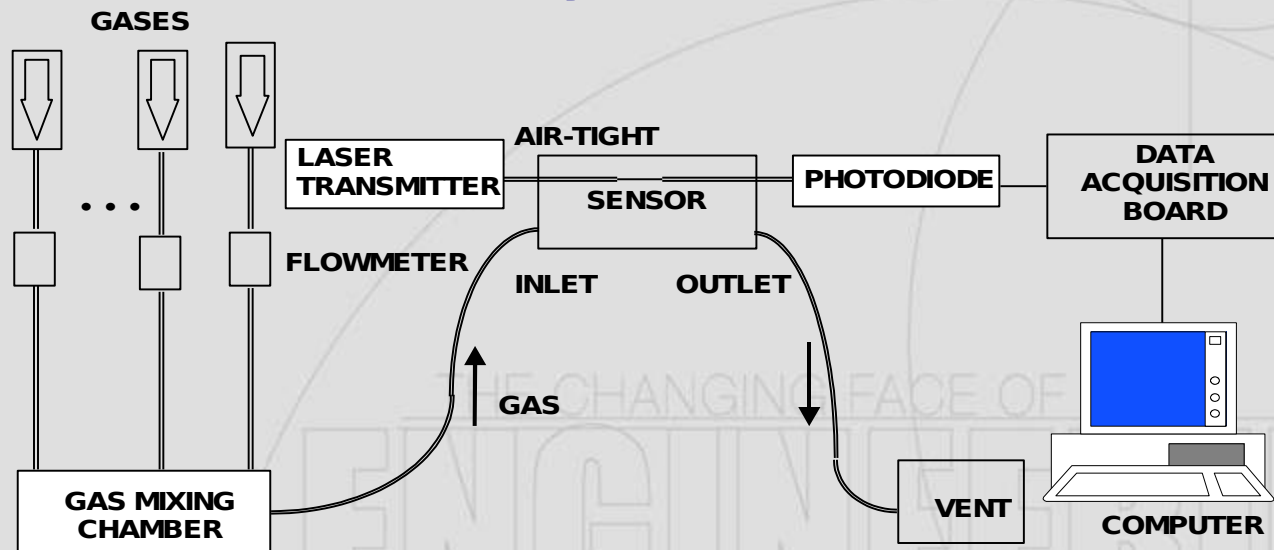
Fiber Optic Research Laboratory

- **Research topics:** fiber optic communications and fiber optic sensors.
- **Sponsors:** NSF, NASA, NSA, Lucent Technologies, JPL, US Navy, TI Foundation.
- **Graduates:** 4 Ph.D.'s, 28 Masters, and 16 undergraduates.
- **Publications:** 13 Journal articles and 65 conference papers.

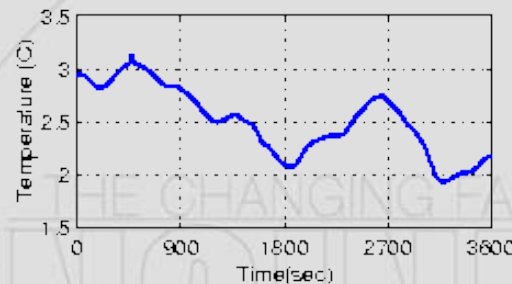
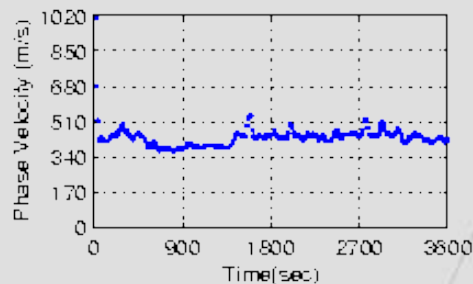
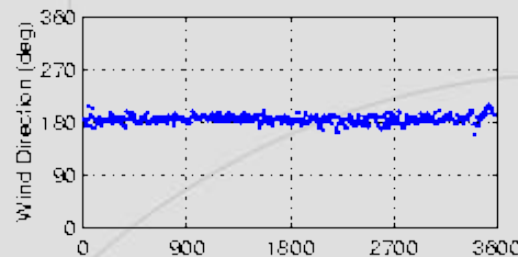
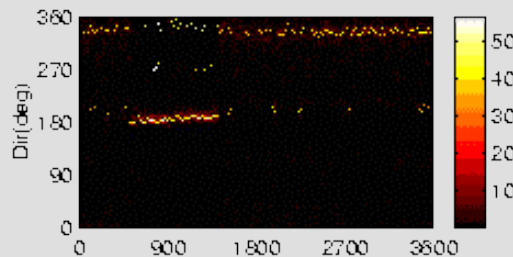
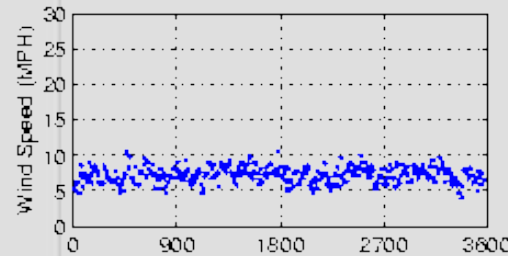
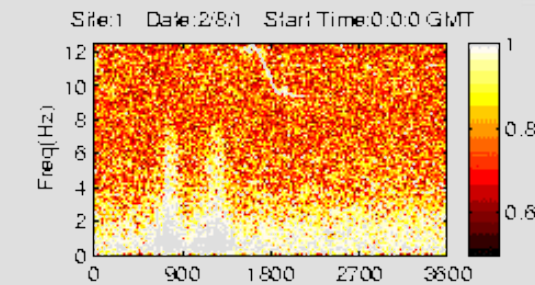


Design, fabrication, and evaluation of fiber optic gas and biological sensors

A collaborative research effort between
Fiber Optic Research Lab in ECE and
Chemistry Department
Funded by: NASA and NSF



Projects in DSP and Telecommunications Labs



- ARO Center for imaging Sciences
- Met Data Compression Feasibility Studies
- 3-D and Network Centered Compression
- Air Quality Analysis Using ARL Radiometer





Electronic Devices Laboratory

Dr. Gregory B. Lush, *Electrical Engineering*

Dr. John C. McClure, *Metallurgy and Materials*

Dr. David Zubia, *Electrical Engineering*

Projects:

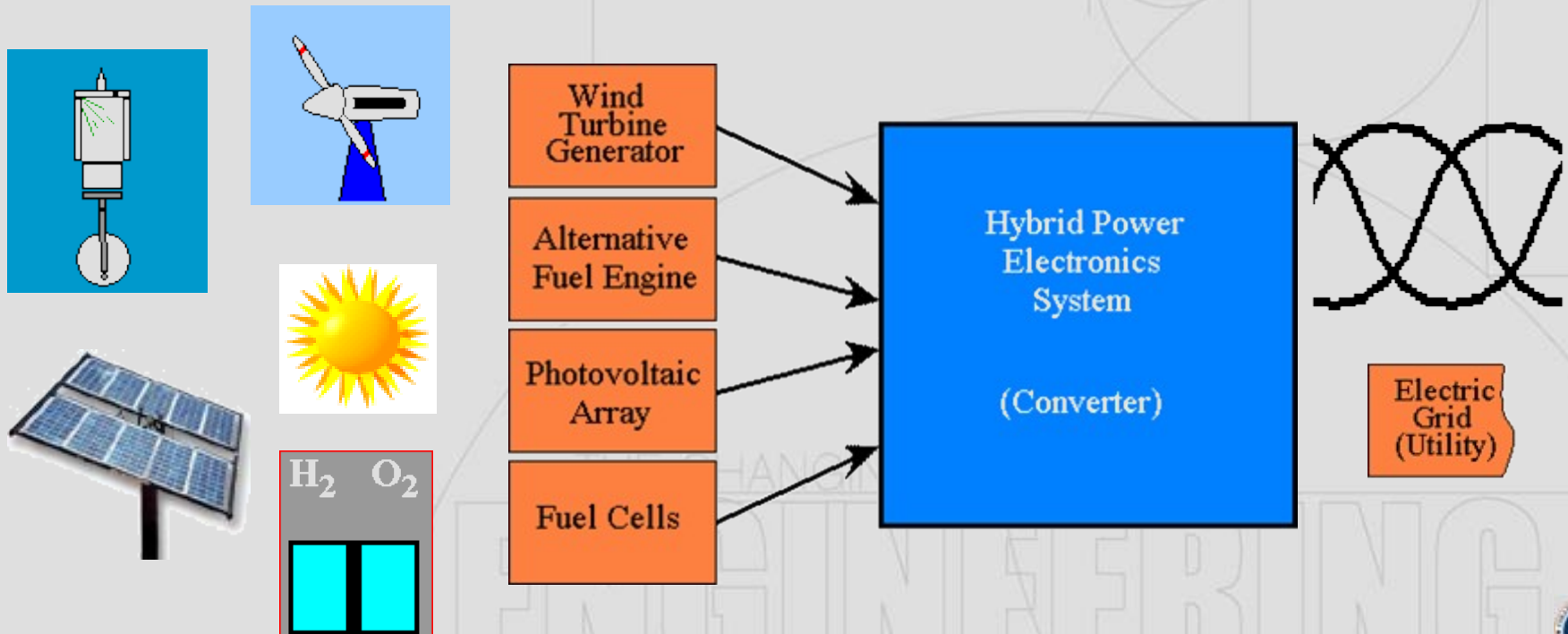
- CdTe-based Thin-Film Solar Cells
- Electroluminescent Display Devices for Flat Panel Monitors
- Artificially Intelligent Device Modeling and Simulation using Genetic Algorithms
- Data Analysis, Management, and Exchange System (DAMES)



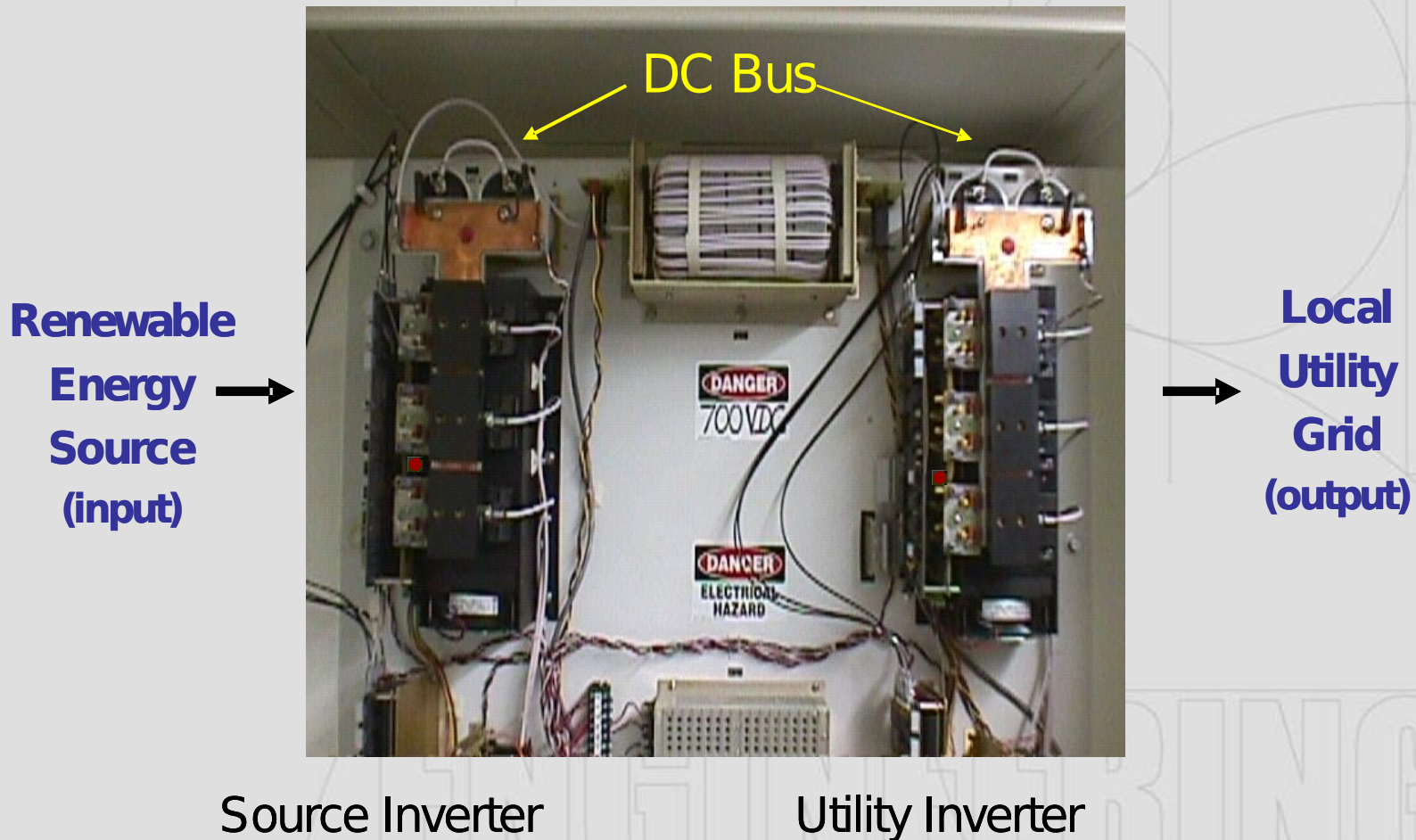
Renewable Power Research

Andrew Swift, Javier Kypuros, Bill Diong

- Develop control strategy for a multi-source power electronics system to provide power to utility grid or stand-alone applications



OEM Hybrid Power Electronics System

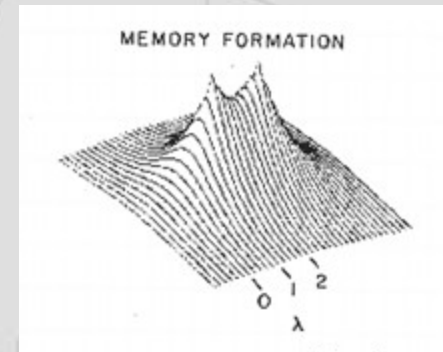
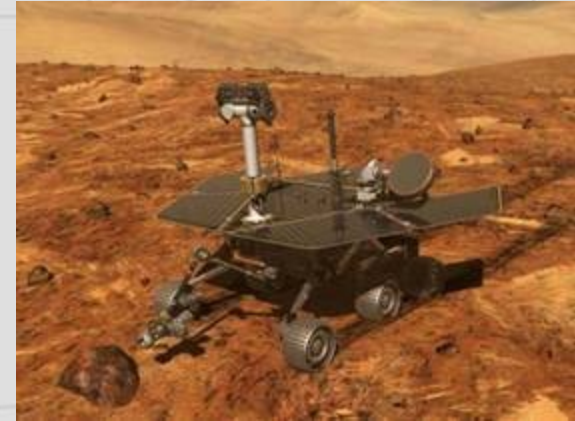


Neuro-Fuzzy Hybrid Systems

Dr. Patricia A. Nava

Objective: Development, simulation and analysis of models that use Artificial Neural Networks and Fuzzy Theory to solve problems that are inherently imprecise; create a hardware implementation.

Potential applications include *autonomous robotic vehicles* (navigation and path planning) and *decision systems* (e.g. sleep characterization, voice recognition) technology.



**Memory
Formation**

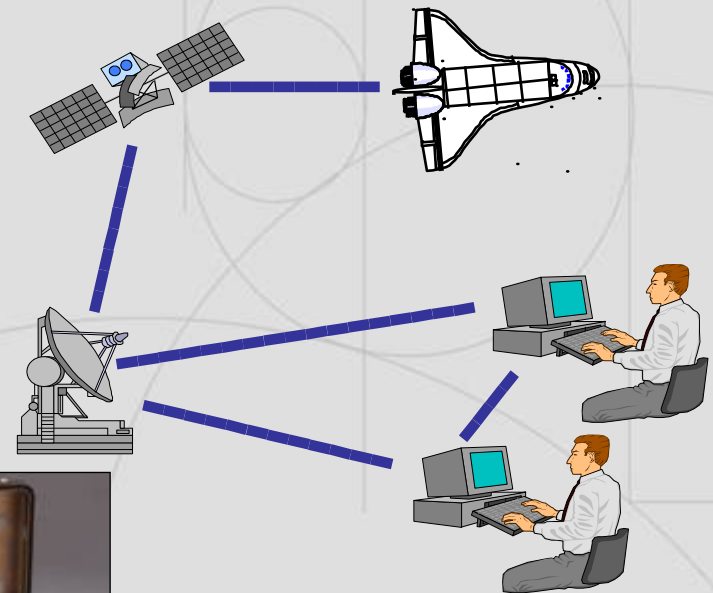


Remote Telemedicine

Drs. David Zubia, John Moya, Bill Diong

**Agreement Signed between
UTEP, NASA and William
Beaumont Army Medical
Center to perform clinical
trials of NASA's TIP package**

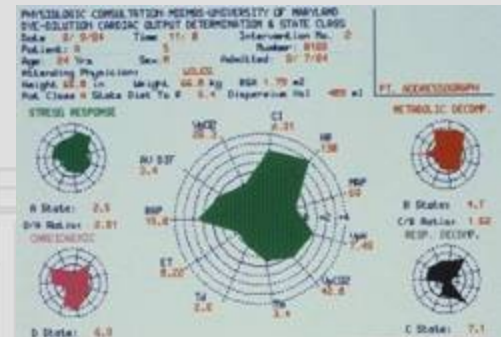
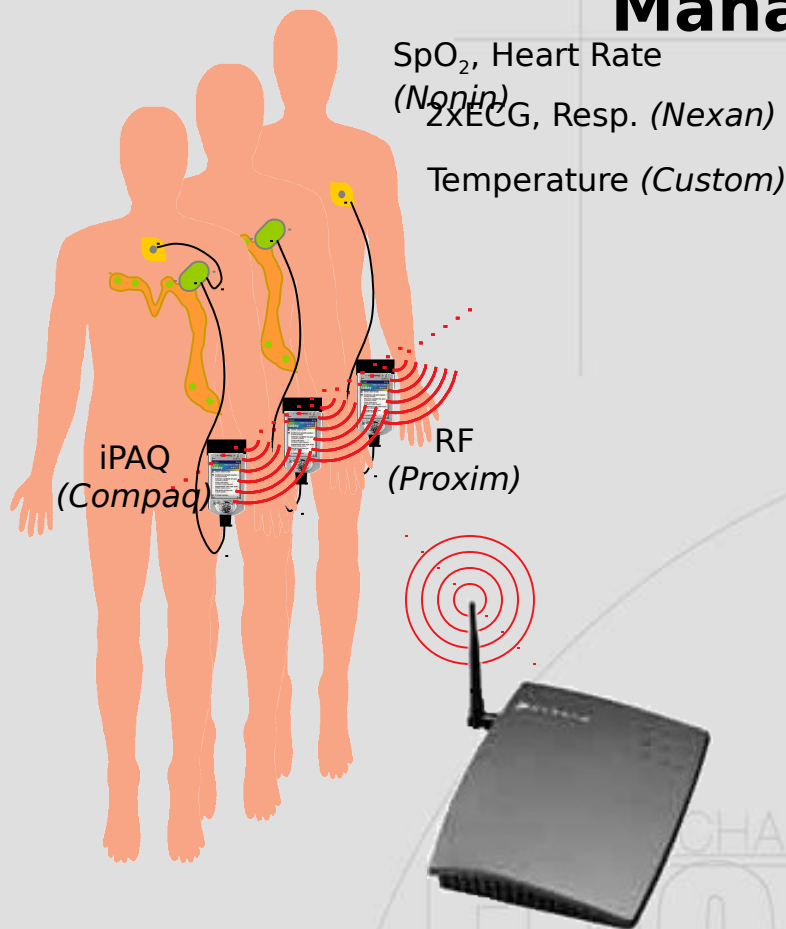
Telemedicine
Instrumentation Pack



Remote Medical Triage, Monitoring, & Management

Unique opportunity to develop technology

- Distributed Computing
- Wireless Medical Applications
- Clinical Process Engineering
- Software Rather Than Hardware Intensive
- 'Local' Intelligence = No Raw Data!!



Departmental Laboratories

Civil Engineering

- Structures/Materials Laboratory
- Geotechnical Engineering
- Water Laboratory
- Hydraulics Laboratory
- Asphalt Laboratory



Characterization of Atmospheric PM at Paso del Norte Air Quality Basin

Dr. Wen-Whai Li

Objectives:

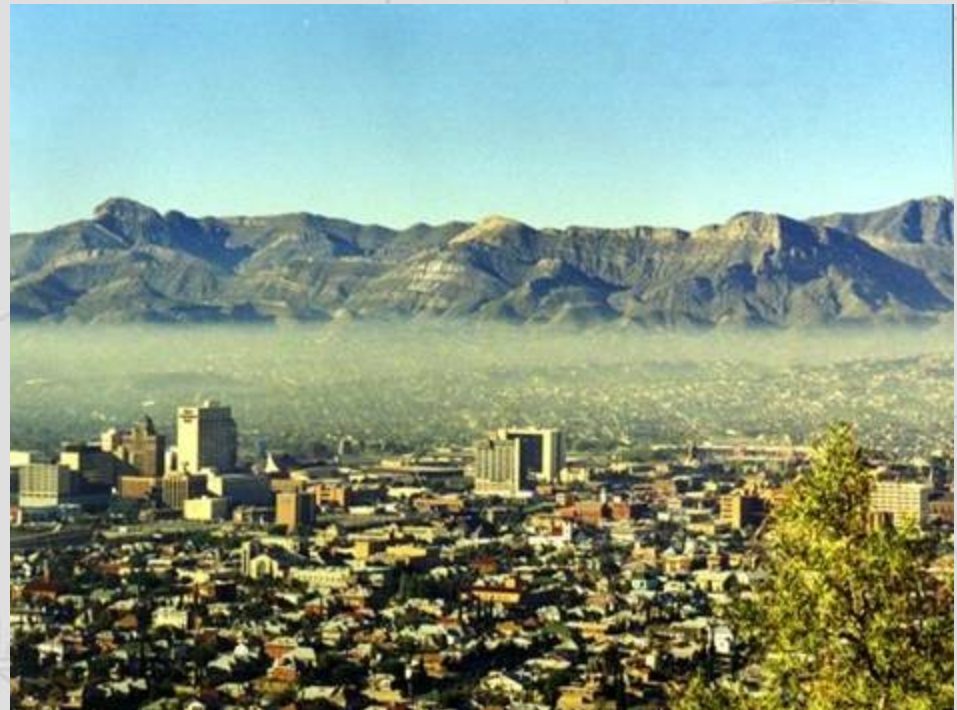
- i) PM characterization;
- ii) Source identification;
- iii) Source apportionment;
- iv) Information center

In collaboration with:

ASU, NMSU, U of U, AUCJ, ITESM.

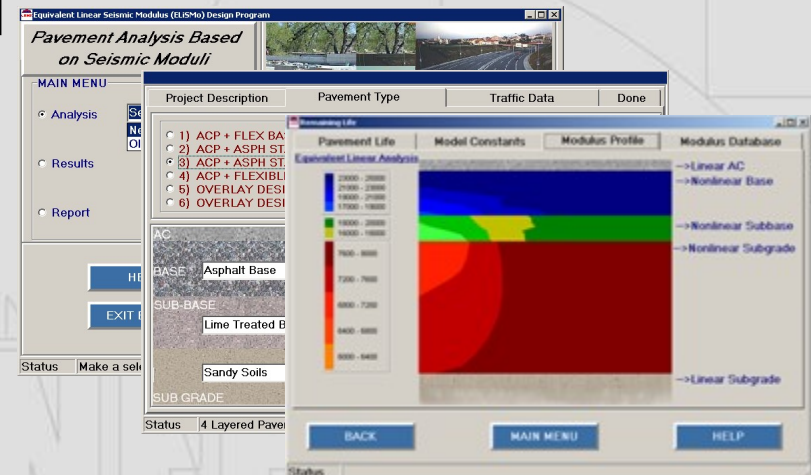
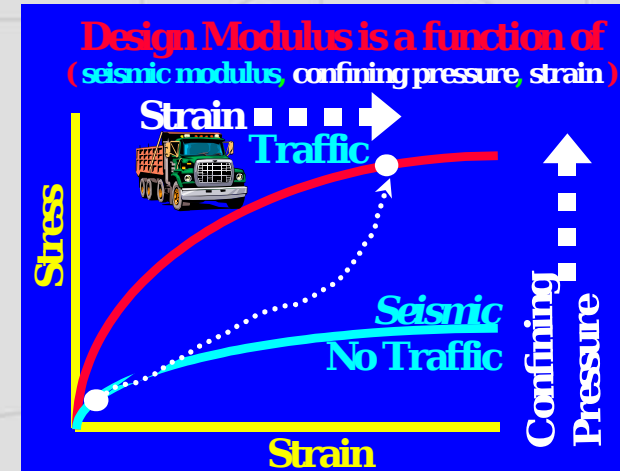
Funding Agencies:

U.S. EPA and SCERP



Design Moduli from Seismic Data

- Establish a mechanistic design procedure that is based on seismic methods
- Develop a program that estimates design moduli by integrating Seismic field data with laboratory tests
- Estimate design modulus based on nonlinear behavior of a pavement section

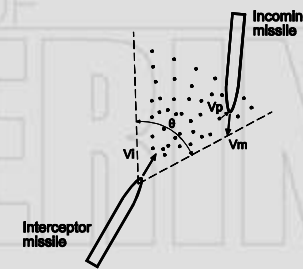
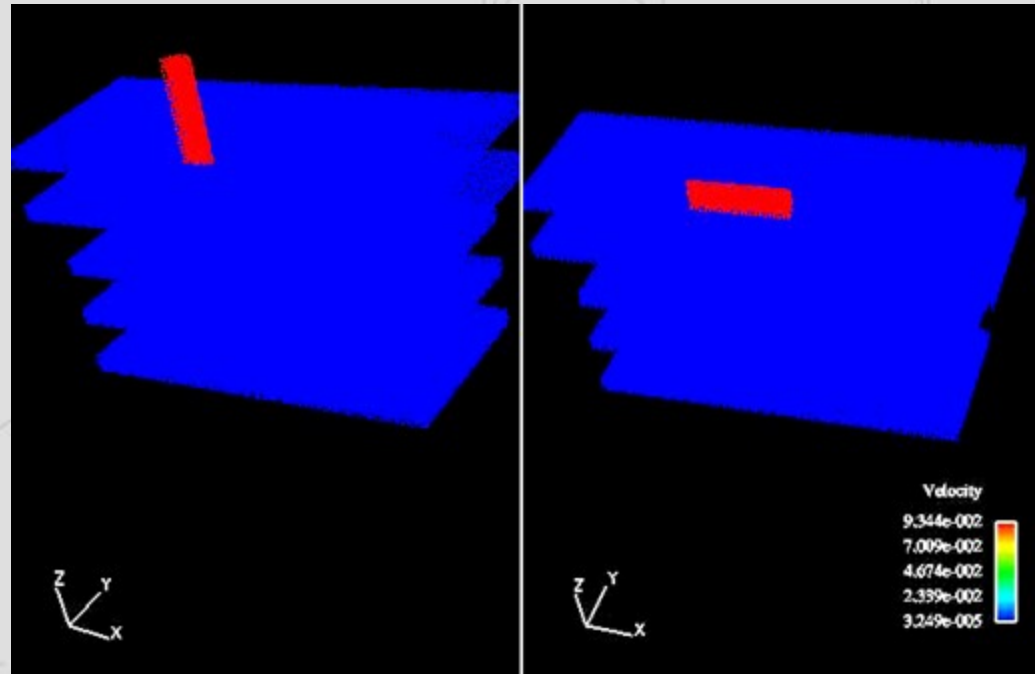


Fracture and Fragmentation Due to Hypervelocity Impact

Drs. C. Carrasco and R. Osegueda

Objective: Simulate projectiles impacting warhead-like systems at hypervelocities. Includes penetration through outer shells and damage to interior warhead.

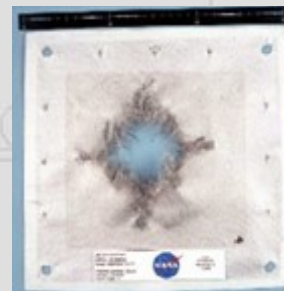
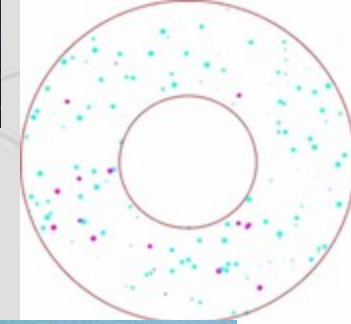
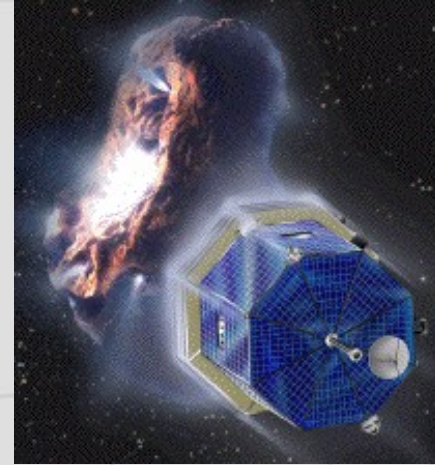
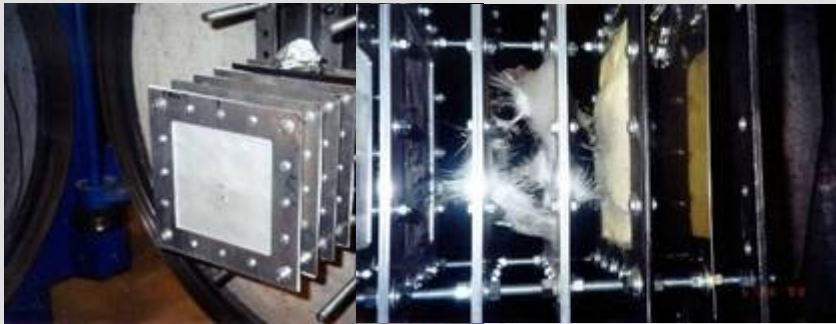
Smooth Particle Hydrodynamics is the method of computations.



CONTOUR Dust Shield Performance

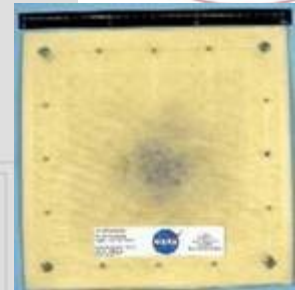
Drs. R. Osegueda and C. Carrasco

- **Objectives:** Design and verify performance of dust shield and develop damage models due to hypervelocity impacts.
- Launched on July 3, 2002



Bumper 4
1-AF10

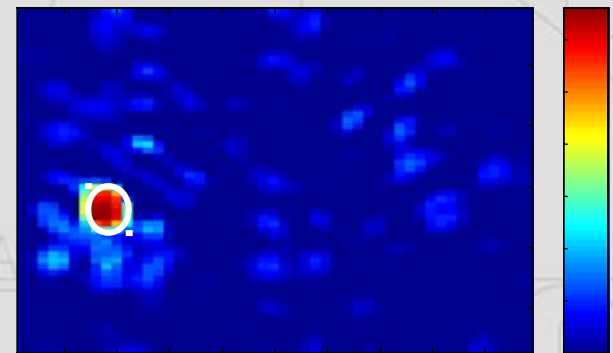
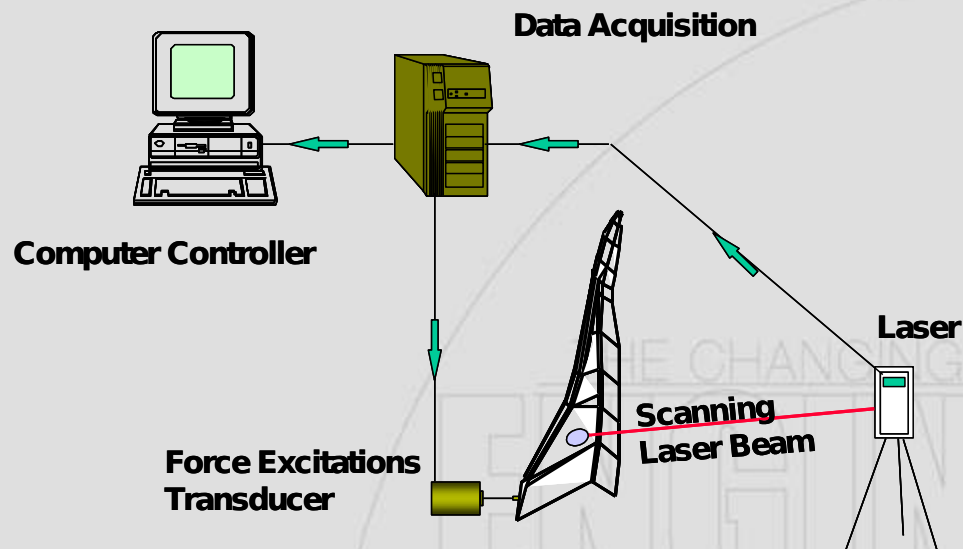
Rearwal
|
3-
Kevlar
(Front)

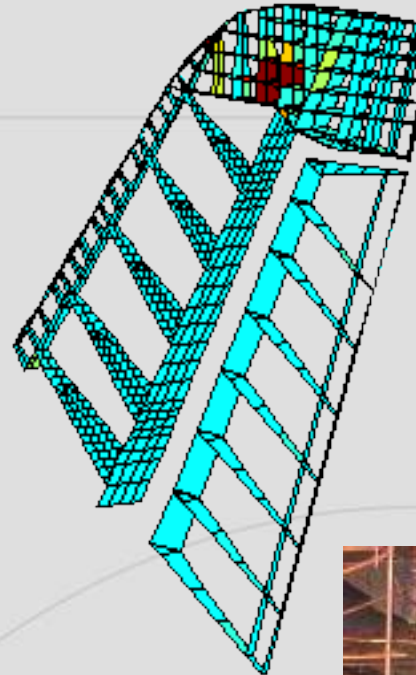


Large Area Structural Health Monitoring

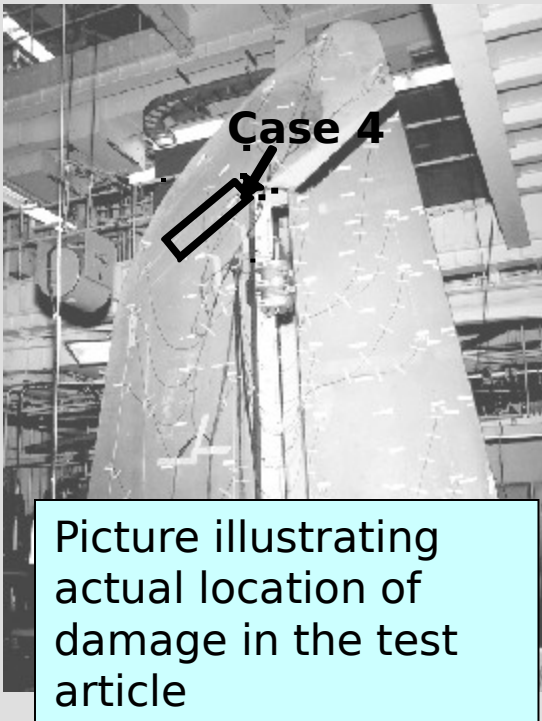
Drs. R. Osegueda, C. Carrasco and C. Ferregut

- Objective: Monitor vibrational characteristics and use data fusion methodologies to monitor structural health and detect damage over large areas





Picture illustrating predicted location of damage using Bayes Fusion



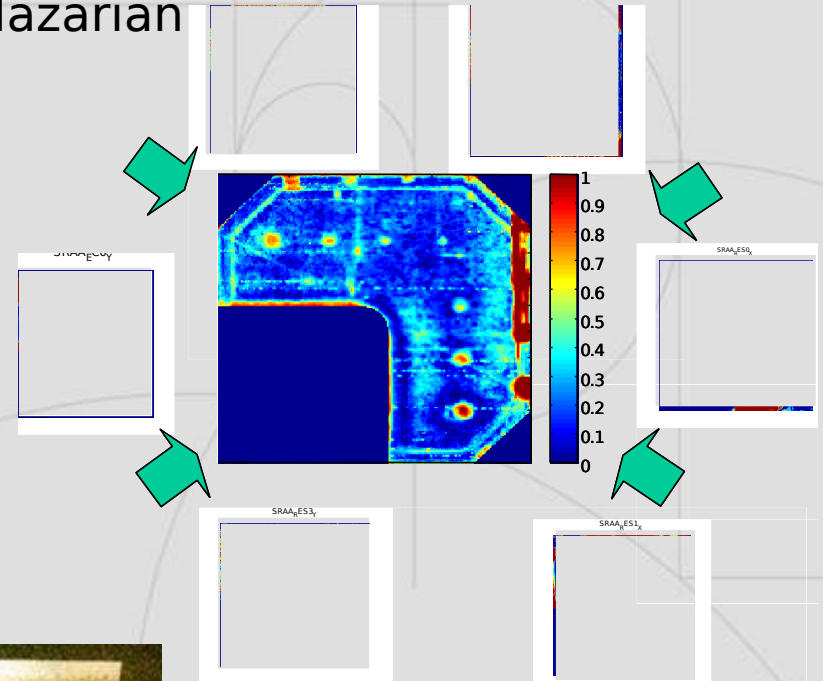
Picture illustrating actual location of damage in the test article



Data Fusion Methodologies for Intelligent NDE

Drs. C. Ferregut, R. Osegueda and S. Nazarian

Objective: Develop intelligent methods based on robust fusion techniques for improved visualization and NDE inspection reliability

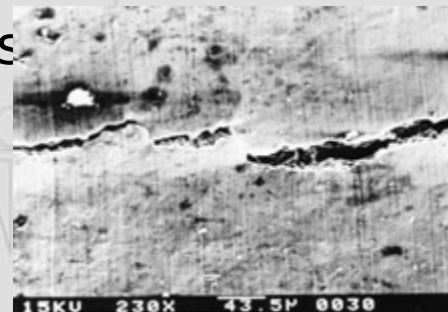
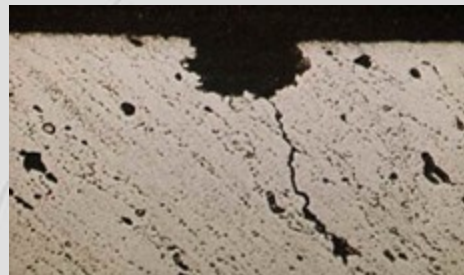
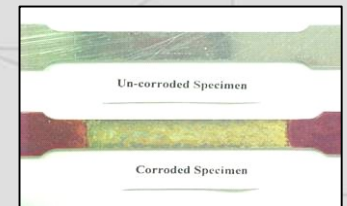


Aircraft Corrosion Research

Drs. C. Ferregut, R. Arrowood & L. Murr

Objectives:

- Understand corrosion forming mechanisms in Aluminum aircraft alloys
- Quantification of corrosion and procedures to estimate remaining strength
- Retrogressing reaging heat treatments
- Corrosion





Mechanical and Industrial Engineering Laboratories

- **Engines and Alternative Fuels**
- **Combustion and Propulsion**
- **Wind Energy**
- **Rapid Prototype and Manufacturing**
- **Ergonomics Safety and Productivity**
- **Controls**
- **Robotics & Automation**
- **Fluids & Heat Transfer**
- **Research & Development**
- **Machine Shop**
- **NASA Flow and Thermal Imaging**
- **Structural Dynamics**



THE CHANGING FACE OF
ENGINEERING





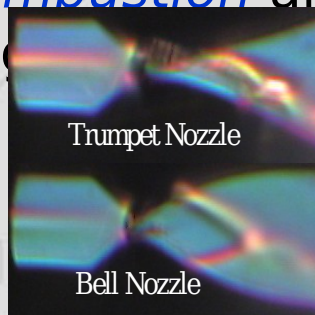
MicroPropulsion Technology

Dr. Ahsan R. Choudhuri

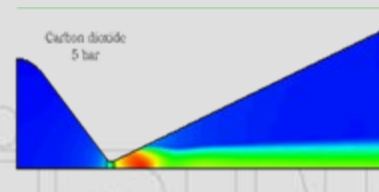
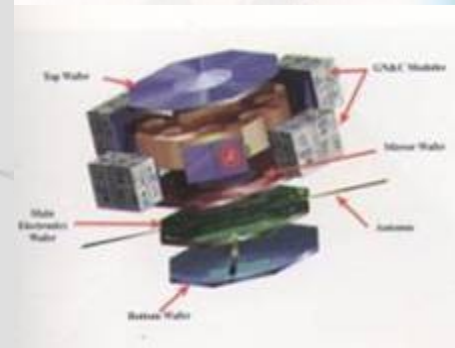
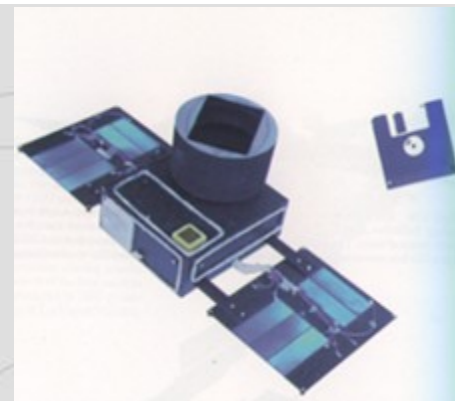
Objective: Development of Propulsion Systems for Microspacecraft and Microsatellites

Current rocket design methodology is inadequate

Requires new understanding and technology platform for rocket-nozzle *microfluid flow dynamics*, *microcombustion* and *reliable valves and seals* technology



Experimental Results



Numerical simulations





Microgravity Combustion

Dr. Ahsan R. Choudhuri

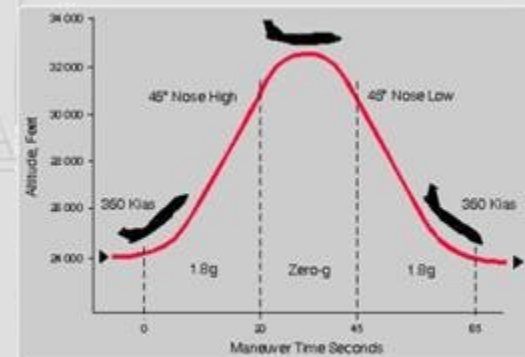
Objective: Understand effects of buoyancy on flame dimensions and near-field heat release mechanism of diffusion flames issued from elliptic burners.

Asymmetric burners (elliptic and triangular) enhance near burner mixing and thus reduce pollution emission.

Experiments aboard the NASA KC-135 Microgravity simulator were conducted on April 25 and 26, 2002 to investigate effects of buoyancy on elliptic jet diffusion flames.



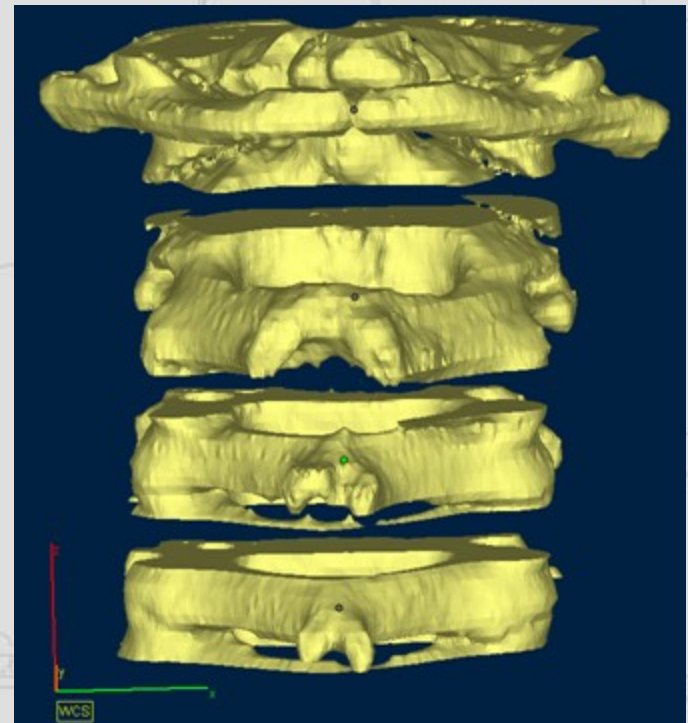
NASA KC-135 Aircraft Flight Experiment



Border Biomedical Manufacturing and Engineering Laboratory

Ryan Wicker & Rolando Quintana

- **\$1 million grant from the W.M. Keck Foundation**
- **Develops scalable, transferable technology for the development of accurate patient-specific anatomical structures**
- **Advances in computational capabilities, medical imaging technologies, rapid prototyping machines, advanced polymers, and experimental fluid measurement techniques enable opportunity**





- **Perform medical imaging scan**
- **Extract anatomical information using software**
- **Construct geometric computer models**
- **Slice geometric model into RP**



Engines and Alternative Fuels Research Laboratory

Student Vehicle Challenges



Propane



Hybrid
Electric

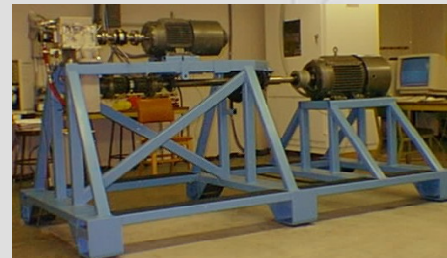


Ethanol

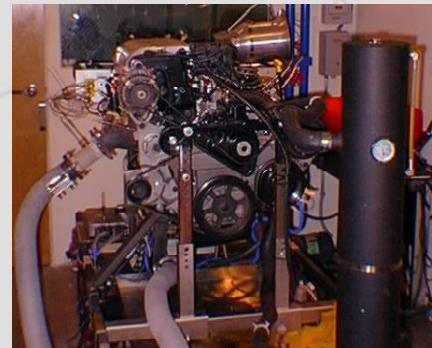


Natural Gas

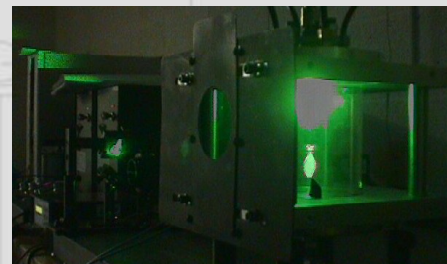
Research Projects



Hybrid Power
Generation



LPG-LPPFI
Engine

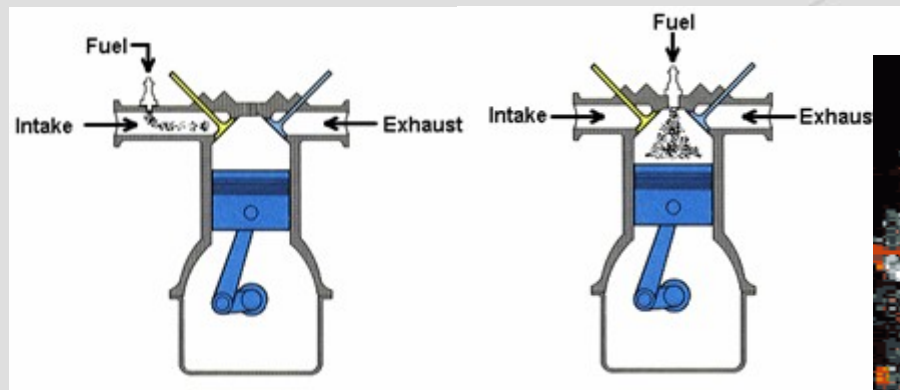


DI Fuel
Spray
Research

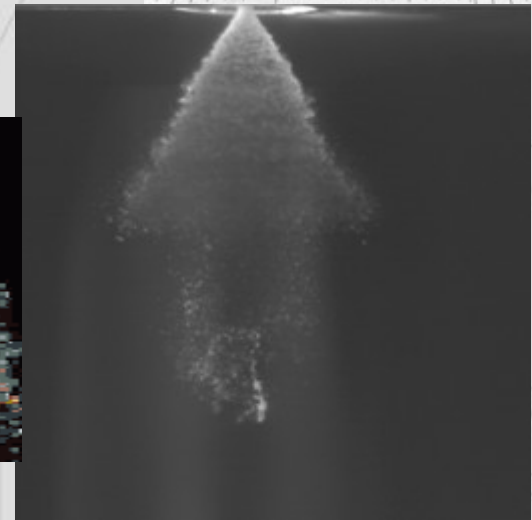
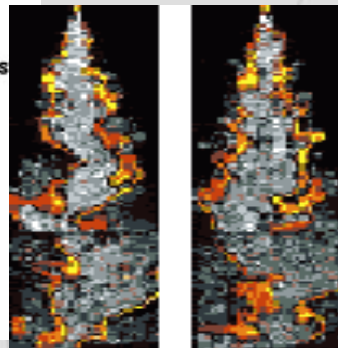
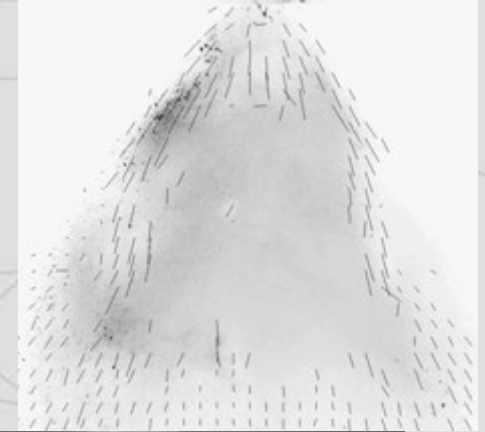


Fuel Spray Research

- Determine the instantaneous structure of the DI fuel injector spray
 - Flow visualization
 - Particle Image Velocimetry (PIV)
 - Particle size measurements



Port Fuel Injection Direct Cylinder Injection



Microstructural Development During Processing of Zirconium Silicide Coatings for UTH Composites

Dr. A. Bronson

Objective: Control oxidation at temperatures greater than 1800°C.

Applications: Thermal protection systems, air-intake turbine engines, re-entry vehicles

Challenges: Oxidation of non-oxide reinforcing fibers, phase stability and compatibility

UTHC Materials



Systems Investigated

Refractory Metal Oxide/Boride Composites

- HfO_2 Matrix/ HfB_2 Fibers
- ZrO_2 Matrix/ ZrB_2 Fibers



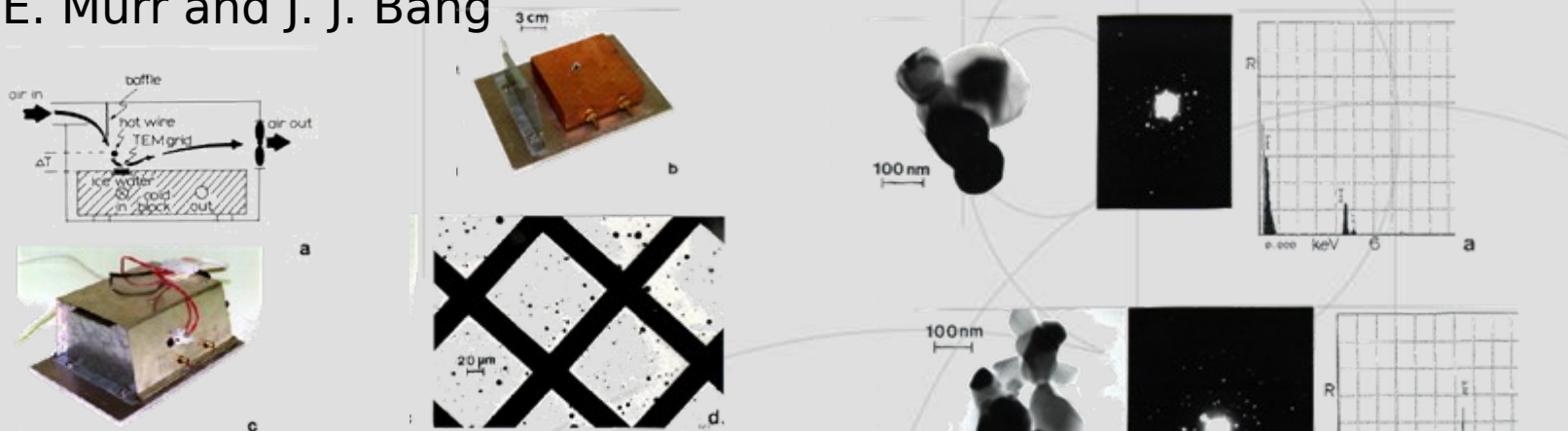
Metallurgical and Materials Engineering Laboratories

- Waste Materials Corrosion
- Scanning Electron Microscopy
- Electron Microscopy Analytical TEM
- Acoustic Tomograph
- X-Ray Diffraction
- Sample Preparation for Electron Microscopy
- Mechanical Testing
- Metallography and Heat Treatment
- Foundry and Welding Research
- Mechanical Testing
- Photography/Dark Room



Collection and TEM Characterization Of Atmospheric Nanoparticles

Drs. L. E. Murr and J. J. Bang



The current, world-wide interest in nanotechnologies and nanomaterials, especially nanoparticulates has heightened concerns for potential health effects of these ultra-fine particulates. Preliminary atmospheric collection by thermal precipitation and transmission electron microscope (TEM)

analysis has revealed the following:

- Essentially all particulates are aggregates
- 79% are crystalline

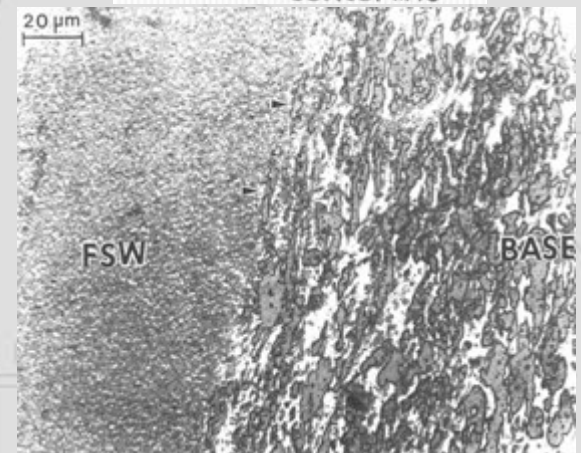
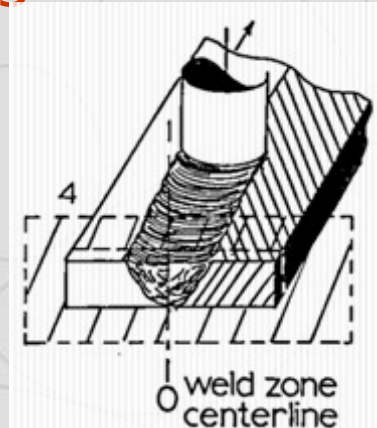


Friction-Stir Welding & Processing for Automotive and Aerospace Manufacturing

Drs. L. Murr & J. McClure

Solid-state (no melting)
Environmentally Conscious
Joining of Aluminum Alloys
and composites including
dissimilar metals (Hybrid
Systems)

MME Department has been a world
leader in FSW research.



Beryllium (62%)-Aluminum (38%)
composite alloy (M.S. Thesis of F.
Contreras)





END OF
PRESENTATION



THE CHANGING FACE OF
ENGINEERING

